

Claims 1, 8 and 42-44 have been amended in order to overcome the Examiner's objections.

With respect to claims 2, 3 and 6, it is believed that the term "substantially" represents a definite recitation. The term substantially means that the word modified thereby exhibits the claimed property more or less. Some minor variation in the property is allowable as long as the device operates as intended. Accordingly, it is believed that the claim is definite and withdrawal of the objection is respectfully requested.

Claim 1, 9 and 35-38 are rejected as allegedly anticipated by Elton '165.

Claims 2-8, 10-34 and 39-47 are rejected over Elton '165, in view of Takaoka '703.

Claims 14, 17, 20, 23, 24 and 28 are rejected under 35 U.S.C. § 103(a) as unpatentable over Elton '165 in view of Lauw '147.

The Examiner's rejection is respectfully traversed for the reasons set forth below.

With respect to the rejection of independent claims 1 and 9 and certain claims depending therefrom as anticipated over Elton '165, the Examiner asserts that Elton discloses an electrical cable with an internal grading layer of semi-conducting pyrolyzed glass fiber in electrical contact with the conductor. Alternatively, the Examiner asserts that Elton discloses an electrical cable with an exterior layer of such material in contact with a predetermined reference potential.

Elton '165 describes a high voltage cable having an inner layer of semi-conducting pyrolyzed glass fiber material and an outer layer of the same material in which the outer layer is grounded. Once the teaching of Elton is fully considered and viewed as a whole, it will be apparent that Elton does not show or suggest the invention alone or in combination with any of the references cited. Even though it is suggested in Elton to apply a semi-conducting layer in the form of a pyrolyzed glass tape to a winding in a dynamo-electric machine, and to apply such a layer in a power cable, there is no indication that the use of such a cable would be useful in a dynamo- electric machine. Indeed, the disclosure of Elton '165 stems from a parent U.S. Patent 4,835,565 which describes three different applications for a semi-conducting layer. One application is for using a pyrolyzed glass tape in a layer in conventional winding or armature bars in a known high current, low voltage dynamo-electric machine. A second application set

forth in the parent of Elton '165 is for a housing to reduce electric discharge in an enclosed circuit. Finally, the parent of Elton '165 employs a semi-conducting pyrolyzed glass layer in a conventional cable. However, there is no proposal to use the cable shown in Elton '165 in a dynamo-electric machine. It is only the semi-conducting tape that is used in a dynamo-electric machine. The arrangement of Elton does not provide a solid insulating system as described and disclosed in the present invention

Is clear that Elton describes the use of a semi-conducting layer as a grounding tape around conventional insulated electrical windings or armature bars which are disposed in the slots of a conventional machine. It should be emphasized that Elton '565 discusses the use of an insulated conductor in the winding of a dynamo-electric machine. Here, the conductor is a conventional rigid bar, not a cable. The Abstract of Elton '165 is identical to the Abstract of the parent which discloses in the specification three different and diverse applications for semi-conducting pyrolyzed glass fiber. Nowhere does the parent Elton et al. suggest that the cable described in the specification could be used for such purpose. The portion of the specification of Elton '165 noted by the Examiner discusses the conventional winding in the background but goes on to describe a high-voltage cable without suggesting that the cable could be used as the winding in the dynamo-electric machine. In view of the differences in operation between conventional armatures and windings that use pyrolyzed glass tape and a power cable that also uses pyrolyzed glass tape, one of ordinary skill in the power generation art would not have been motivated at the time the invention was made to substitute the power cable for the winding since the prevailing thought at the time was that cable wound electric machines would not operate successfully at high voltage. Furthermore, Elton itself does not teach or suggest the substitution but merely provides yet another indication that those of ordinary skill in the power industry would recognize windings as being in a different field of endeavor than power cables. Elton merely describes that the pyrolyzed glass tape may be used in these two different fields of endeavor, namely, windings in electric machines and also in power cables. Thus, it is believed that Elton '165 has no applicability to the arrangement described in the present invention.

There is no suggestion that the conventional winding of Elton '565 having a semiconducting grounding tape could be modified by substitution of the cable of the

invention. The reference simply employs semi-conductive material in conventional machine winding and in a cable structure. Elton '165 does not disclose that it would be useful to use the cable as the winding. This is because, for a given power level  $P=E \cdot I$ , where  $P$ =power,  $E$ =voltage, and  $I$ =current, when the voltage is high the voltage is consequently low and vice-versa. As such, the conductor in a high voltage machine according to the invention can be flexible and have a relatively small cross section (as in a cable). Such conductor need not have a capability of carrying a high current. In a high power machine in which current is high and the voltage is relatively low, the conductors are formed of shaped, rigid, high cross-sectional area copper bars. The problems associated with high current operation typically involve thermal considerations, whereas at high voltage, insulation breakdown is a predominant failure mode. Thus, it is not obvious to combine an essentially high voltage device, such as a power cable in a high current device, such as a high power machine. It is not merely the fact that the voltage in one machine is much higher than the other, it is that the problems associated with high voltage operation are entirely different from problems associated with high current operation, and the focus of the designer is thus entirely different.

The Examiner's rejection of the dependent claims over Elton, in view of Takaoka or Lauw, is likewise respectfully traversed. The Examiner asserts that Elton discloses the invention except for having the generator with windings comprising a plurality of insulating conductive elements, and at least one uninsulated conductive element. The Examiner cites Takaoka et al. for the proposition that Figures 7, 8, 10 and 11 thereby teach a stranded conductor with insulated and uninsulated strands. However, Takaoka discloses a power cable and method of manufacture. As noted above, the invention is directed the use of a high voltage cable in an electric machine. There is no suggestion that the Takaoka cable could be used in a machine in the manner claimed. In addition, there is no teaching in Takaoka showing the electric field confining cable of the invention.

While the invention employs insulated and uninsulated conductors in the conductive core of the cable, under some circumstances, uninsulated conductors may be employed alone. For example, in operations where the magnetic flux is relatively low, eddy currents, which may be produced in the conductive core, may not be sufficient to

cause excessive heating. Thus, the expense of providing insulated conductors would not be necessary. In those situations where the magnetic field intensity is high, it would be useful and desirable to insulate the conductive elements so that eddy currents are suppressed. However, in any case, at least one conductor would be uninsulated and would be in electrical contact with the inner layer so as to establish an equipotential surface for confining the electric field. The arrangement of the invention thus allows for high voltage operation in electric machinery not heretofore achievable.

The Examiner's rejection of the claims over Elton, in view of Lauw, is likewise respectfully traversed. The Examiner asserts that Lauw teaches the use of transformers to step up or step down the voltage and which would be contingent upon the requirement of the application. The Applicants do not argue that transformers are not known or that transformers are not operable to step up or step down the voltage. However, the combination of Elton and Lauw does not result in a machine with a winding forming an electric field confining cable according to the present invention, because Elton does not teach the use of the cable as a winding in an electric machine. Elton teaches the use of a semi-conductive grounding tape for a conventional rigid conductor used as the winding in an electric machine. The cable embodiment in Elton is separate and distinct and should not be confused with the entirely different embodiment wherein a semi-conducting material is used as a grounding tape in the winding of a dynamo-electric machine.


It is not clear whether the Examiner is suggesting that the transformer discussed in Lauw would operate above 36kV. In the present invention the winding has a grounded neutral circuit. That is, the conductor portion of the cable forming the winding of the electric machine is coupled to ground either directly or through a transformer winding, which itself employs the cable structure of the invention in its winding. Thus, the present invention does not simply employ a transformer in the neutral circuit of the machine but employs a cable structure as the winding of said transformer which has not heretofore been employed.

None of the references show or suggest that it would be useful to employ high voltage cable as a winding in a machine including a dynamo-electric machine or a static machine.

It is therefore believed that the various combinations asserted by the Examiner do not teach or suggest the claimed invention.

In view of the foregoing, it is respectfully requested that the Examiner reconsider his rejection of the claims, the allowance of which is earnestly solicited.

Respectfully submitted,

  
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